

Membrane-Supported Thermoelectric Generator, Phase II

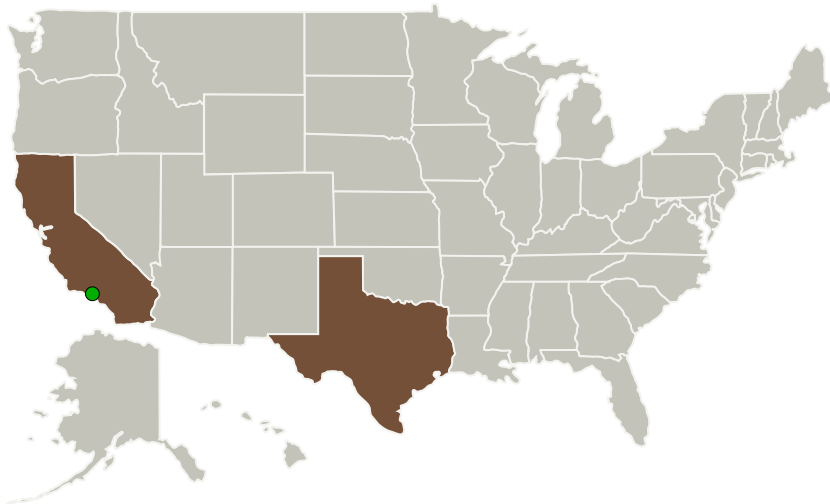
Completed Technology Project (2017 - 2019)



Project Introduction

Solid-state thermoelectric (TE) devices provide many advantages in refrigeration (TE coolers) and power generation (TE generators). These highly reliable devices have no moving parts, operate over a large range of temperatures, and do not emit toxic or environmentally-unfriendly gases. These devices can be easily integrated into thermal energy conversion systems that meet NASA needs for innovative space power generation on orbiting platforms, extraterrestrial surfaces, and space transportation vehicles. To date, the adoption of TE generator (TEG) devices in energy scavenging/power recovery applications has been hampered by a lack of TE material compositions, no high throughput production methods for large-area conformable TEG devices, and high cost-per-unit area for tiling rigid plate TE devices. Production of large-area sheets of high-ZT TEG devices that conform to space vehicle and other relevant thermal gradient surfaces would be highly beneficial. This effort develops membrane-supported thermoelectric device manufacturing technology with in-situ sintering of high-ZT thermoelectric powders dispersed across a fiberglass sheet matrix serving as a mechanical support. The method provides intrinsic densification of the TE powders between the two faces of the fiberglass sheet and allows for large-scale conformable thermoelectric sheets to be produced with high performance at low cost.

Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|----------------------------------|-------------------------|-------------|----------------------|
| Nanohmics, Inc. | Lead Organization | Industry | Austin, Texas |
| ● Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California |

| Primary U.S. Work Locations | |
|-----------------------------|-------|
| California | Texas |

Project Transitions

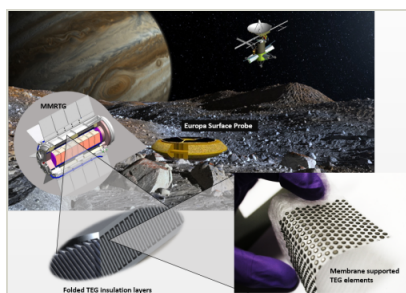
▶ **April 2017:** Project Start

✓ **October 2019:** Closed out

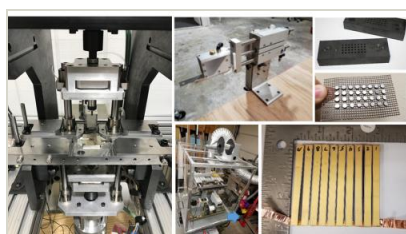
Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141029>)

Images

**Briefing Chart Image**

Membrane-Supported Thermoelectric Generator, Phase II Briefing Chart Image (<https://techport.nasa.gov/image/135694>)

**Final Summary Chart Image**

Membrane-Supported Thermoelectric Generator, Phase II (<https://techport.nasa.gov/image/135826>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nanohmics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

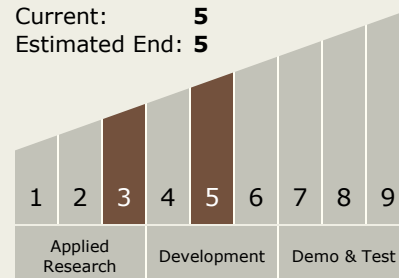
Carlos Torrez

Principal Investigator:

Steve Savoy

Technology Maturity (TRL)

Start: 3
Current: 5
Estimated End: 5



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.2 Heat Sources

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System